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| 09/387,961 | 11/22/1999 | PAUL A JAKOBSON | JAKOBSON-6 | 3219 |

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SILVY A MURPHY
CORNING INCORPORATED
SP TI 03 1
CORNING, NY 14831

EXAMINER

CUNNINGHAM, STEPHEN C

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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3662

DATE MAILED: 03/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/387,961

Applicant(s)

JAKOBSON ET AL.

Examiner

Stephen C. Cunningham

Art Unit

3662

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-37 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) _____ is/are rejected.
- 7) ☒ Claim(s) 2 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 and 8. 6) ☐ Other:

DETAILED ACTION

Drawings

The drawings are objected to because they are not descriptive. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Objections

Claim 2 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Each sub-unit that is mounted to the support board acts as a mounting apparatus for the fiber-optic connectors.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

1. Claims 19-21 and 32 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claim 19, is “wherein each of said optical signal amplifying, input and output component groups includes a maximum number of said optical components common to each of said first, second, third, and fourth optical amplifiers” intended to mean that in summation of each component in amplifier designs one, two, three, and four there is a component in each component group that is used a maximum number of times; or that in an there is a maximum number of components that go into an amplifier? It is unclear what “subset components group” is intended to encompass.

With respect to claim 20, the claim fails to disclose what each component is mounted on. The examiner will assume that this is intended to be the support board.

With respect to claim 21, it is indefinite how arranging the components causes the splice to be a low-loss and high strength splice.

With respect to claim 32, the term effect could either mean that there are additional components included in the amplifier that modify the described characteristics or that different components are used that provide similar function, for example a different first stage gain fiber with different specifications.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claims 1-6, 8, 10-14, and 31-36 are rejected under 35 U.S.C. 103(a) as being obvious over Flood et al. in view of Csipkes et al. and Iwano et al.

The applied reference has a common assignee and one common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). For applications filed on or after November 29, 1999, this rejection might also be overcome by showing that the subject matter of the reference and the claimed

invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person. See MPEP § 706.02(I)(1) and § 706.02(I)(2).

With respect to claim 1, Flood et al. teach an optical amplifier comprising:

a sub-unit comprising a first pump with a wavelength λ_1 ;

a second sub-unit comprising a plurality of first stage optical amplifying components;

a third sub-unit comprising a plurality of input stage components;

and

a fourth subunit comprising a plurality of output stage components.

See figure 1.

Csipkes et al. teaches a modular optical amplifier with amplification modules, a service module (pluggable sub-unit), and pump modules, see figure 1 and column 3, lines 3-15, mounted on a support board, see column 3, lines 10-12. Iwano et al. teach a pluggable optical connector. It would have been obvious to modify the apparatus of Flood et al. by making each of the amplification sub-unit, the pump sub-unit, the telemetry drop (input) sub-unit, and the telemetry add (output) sub-unit modular in order to achieve an easily configurable amplifier.

With respect to claim 3, Flood et al. teach a plurality of components for a second stage optical amplifier. It would have been obvious to include

a second stage amplification element in the second sub-unit in order to allow for the high gain, low noise aspects of dual-stage amplifiers.

With respect to claim 4, Flood et al. teach a second pump source with wavelength λ_2 . It would have been obvious to modify the apparatus to include a second pump module to allow for flexible pump configuration.

With respect to claim 5, Flood teaches first and second stage amplifier components in the order: WDM, EDF, isolator, gain flattening filter, WDM2, EDF2. It would have been obvious to modify the apparatus to form an amplifying module with components in said order to provide an easily exchangeable gain stage.

With respect to claim 6, Flood et al. teach that both of the pump sources generate the same wavelength light, see figure 1.

With respect to claim 8, Flood et al. teach that both of the pump sources generate 980 nm light, see figure 1.

With respect to claim 10, it would have been obvious to modify the apparatus so that the input module contains the tap coupler and photodetector taught by Flood et al. to allow for system monitoring.

With respect to claim 11, Flood et al. teaches each of the claimed components but fails to teach the precise location of the VOA as claimed. It would have been obvious to modify the apparatus by shifting the VOA to the location between the supervisory channel drop and the tap coupler so as to allow a supervisory channel to be demultiplexed with greater power.

With respect to claim 12, Flood et al. teach a second tap coupler connected to a second photodetector in the output stage. It would have been obvious to include in the output module a tap and photodiode to allow for system monitoring.

With respect to claim 13, Flood et al. teach the output stage as claimed. It would have been obvious to modify the apparatus by making the output stage modular in order to allow flexibility in monitoring propagating signals.

With respect to claim 14, Iwano et al. teach an optical plug unit comprising a first-half member and a mating half member (plug and jack.) It would have been obvious to modify the apparatus to contain first and second -half members, which fit together to prevent shifting at the connection.

With respect to claim 31, Flood et al. teach a first pluggable pump source, a first and second signal amplifying stage, an input stage, an output stage, and a second pump source optically connected to make an optical fiber amplifier. Csipkes et al. teach a modular optical amplifier comprising: an optical gain module, two pump modules, and a module comprising nonamplifying components. Iwano teaches an optical plug connection for joining fiber optic components. It would have been obvious to modify the method of Flood et al. to provide a first pluggable pump module, a second pluggable signal amplifying module, a third pluggable

input module, a fourth pluggable output module, and a fifth pluggable pump module with said pluggable connectors mounted on an edge of each module in order to provide an easily manufacturable optical amplifier.

With respect to claim 32, Flood et al. teach configurations wherein the input stage and the output stage comprise a sub-set of components from the respective component groups, see figures 1, 2, and 3. It would have been obvious to modify the method by substituting a sixth pluggable sub-unit for the second amplifying sub-unit wherein the sixth subunit formed from said fourth group of components in order to produce an amplifying sub-unit with a different target gain.

With respect to claim 33, it would have been obvious to modify the method so that the sixth pluggable sub-unit is optically connected to at least one of said first and fifth pluggable subunits to provide optical energy for amplification, one of said third and seventh pluggable subunits to monitor input signals, and one of said fourth and eighth pluggable subunits to monitor output signals.

With respect to claim 34, it would have been obvious to construct each of said first, third, fourth, fifth, seventh, and eighth fiber-optic connectors to couple optical components with similar optical fibers to improve system uniformity.

With respect to claim 35, it would have been obvious to test the power and wavelength of each pump module for matching specifications and functionality;

to assemble, connect to a known signal source, and to measure the signal present at said output end of each input and output module;

to assemble, connect to a test information signal, connect to a pump source, and to measure the signal at the output end of the signal amplifying module;

to reject any module that does not meet performance requirements, or accept modules that meet requirements;

to mount accepted amplifying, input, output, and pump module on a substrate,

connect each module;

and to test each module

in order to construct an modular optical amplifier that is known to have properly functioning components.

With respect to claim 36, it would have been obvious to mount a second accepted pump module on said substrate;

optically connect said pump module to said amplifying module; and

to test said second accepted pump module on said substrate in order to supply additional optical power to the amplifier and to allow for a soft shutdown.

2. Claims 7 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Flood et al. in view of Csipkes et al. and Iwano et al. as applied to claim 4 above, and further in view of Becker et al.

With respect to claim 7, Becker et al. teach that it is beneficial to pump a dual stage amplifier with different wavelengths to produce desirable noise and gain figures.

With respect to claim 9, Becker et al. teach that the first and second stage, erbium doped fibers, may be pumped with 980 and 1480 nm light respectively. It would have been obvious to pump a first and second stage amplifier with 980 and 1480 nm light respectively to provide a low noise high power amplifier.

3. Claims 15-30 and 37 are rejected under 35 U.S.C. 103(a) as being obvious over Flood et al. in view of Csipkes et al., Iwano et al., and Webster's Collegiate Dictionary.

With respect to claim 15, the method of providing pumping, amplifying, input, and output sub-units and connecting via said sub-units via pluggable fiber optic connectors is inherent in the apparatus as rejected in claim 1. It would have been obvious from the definition of modular: *constructed with standardized units or dimensions for flexibility*

and variety in use to provide a plurality of different subunits of each variety and selecting the desired sub-unit to produce flexibility in design.

With respect to claim 16, it would have been obvious to provide a design for any number of optical amplifiers to fit any given system.

With respect to claim 17, it would have been obvious to divide the optical components up into functional groups in for organizational (inventory) purposes. Such inventory systems are well known, for example, retail stores and libraries store items with greater or lesser similarity in concept in relative proximity.

With respect to claim 18, it would have been obvious to further divide the pumping components into a first pump component group and a second pump component group in order to further organized pump component storage.

With respect to claim 19, it would have been obvious to include a maximum number of components common to each amplifier design for efficient flow of materials to the manufacturing process.

With respect to claim 20, assuming that the intended mounting is the support board, Csipkes et al. teach mounting optical modules on a support board. It would have been obvious to mount the sub-units on a support board in order to prevent shifting which could damage the components.

With respect to claim 21, It would have been obvious to provide high strength and low-loss splices in order to improve durability and reduce loss. Loss reduction is a well known motivation in the art.

With respect to claim 22, Csipkes depicts connectors attached to the edge of the modular amplifier. It would have been obvious to mount the pluggable connector on the edge of each sub-unit in order to provide easy access to the connector.

With respect to claim 23, It would have been obvious to determine which sub-units share common fiber and which use different fiber and to provide appropriate interface between the sub-units in order to reduce noise.

With respect to claim 24, it would have been obvious to mount a first half member of the fiber optic connector on the pump and the second half member of the fiber optic connector on the amplifying sub-unit so that the pump can efficiently provide energy to the amplification medium.

With respect to claim 25, it would have been obvious to mount the first half connector to the input sub-unit and the second half connector to the amplifying sub-unit so that the input subunit can efficiently transfer signals to the amplifying medium.

With respect to claim 26, it would have been obvious to mount the first half connector to the output sub-unit and the second half connector to

the amplifying sub-unit so that the amplifying subunit can efficiently transfer signals to the output sub-unit.

With respect to claim 27, Flood et al. teach that the first amplifier is a line amplifier.

With respect to claim 28, Flood et al. teach that the second amplifier is a line amplifier.

With respect to claim 29, Flood et al. teach that the third amplifier is an output amplifier.

With respect to claim 30, Flood et al. teach that the fourth amplifier is an input amplifier.

With respect to claim 37, Flood et al. teach different types of sub-units. Csipkes et al. teach a modular optical amplifier. Iwano et al. teach a pluggable optical connector. Webster's Collegiate Dictionary defines modular: constructed with standardized units or dimensions for flexibility and variety in use. It would have been obvious to provide a supply of at least four functional groups wherein each functional group contains at least n types of subunits, wherein three of the functional groups include first half pluggable connector and the fourth group includes three second half pluggable connectors in order to produce amplifiers for a variety of uses; and

Connecting the sub-units from each functional group via the pluggable connectors to form a desired design to fit a specific system requirement.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 1, 3-5, 7, 9, and 10 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 9 of U.S. Patent No. 6,134,047 in view of Csipkes et al. and Iwano et al. Claim 9, bearing all the limitations of claims 1, 2, and 5 on which it depends, teaches a node comprising an dual stage doped-fiber amplifier, an input stage comprising an optical isolator, a supervisory channel drop unit, and a power tap, and an output stage comprising an optical isolator, a power tap and a supervisory channel add unit. Csipkes et al. teach a

modular optical amplifier comprising amplification modules and a supplementary wherein the supplementary module comprises a telemetry add/drop unit. Iwano et al. teach a plug connector for optical transmission. It would have been obvious to make the apparatus of Flood et al. modular so that the apparatus comprises an amplification module, supplementary input and output modules and pump modules which connect via optical plug connectors to form an easily configurable amplifier with easily replaceable components.

With respect to claim 3, Patent No. 6,134,047 claim 1 teaches a second doped-fiber gain stage which inherently comprises a plurality of components including a doped fiber and coupler that couples pump light and signal light into said doped fiber.

With respect to claim 4, it would have been obvious to include a fifth module having a second pump source to increase pumping power to the second module.

With respect to claim 5, it would have been obvious to modify the invention to include a WDM to supply pump power to the doped fiber, an optical isolator to prevent back reflections from saturating the first stage amplifier, and a second WDM to couple a second pump beam into the second doped fiber.

With respect to claim 7, Csipkes et al. teach the first pump source and the second pump source pumping with different wavelengths, see

Art Unit: 3662

figure 1. it would have been obvious to modify the apparatus to pump with differing wavelengths to control the gain and noise performance of the amplifier.

With respect to claim 9, Csipkes et al. teach that the first pump source pumps with a wavelength of 980 nm and the second pump source pumps with a wavelength of 1480 nm. It would have been obvious to modify the apparatus to pump with said wavelengths in order to achieve a low noise high gain amplifier.

With respect to claim 10, Patent No. 6,134,047 claim 5 teaches an input power tap. It would have been obvious to connect the tap to a photodetector in order to monitor the input power to achieve a gain control circuit.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Mueller-Fiedler et al.;

Bernhardt et al.;

Rawlings;

Delrosso et al.;

Kawasaki et al.;

Kinoshita;

Tsushima et al.;

Nakabayashi;

Fatehi et al.;

Federici et al.;

Takeshi et al.;

Giles et al.;

Kinoshita et al. July 1998;

Nishida et al.;

Yang et al.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen C. Cunningham whose telephone number is 703-605-4275. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 703-306-4171. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-7687 for regular communications and 703-305-7687 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-306-4180.

Application/Control Number: 09/387,961

Page 18

Art Unit: 3662

March 11, 2002

A handwritten signature in black ink, reading "Thomas H. Tarcza". The signature is written in a cursive style with a large, stylized 'T' and 'H'.

THOMAS H. TARCZA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 3600